

# Insurance Business Optimization

*Full Stochastic Approach*



## Spring Actuarial Get-together

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Člen skupiny KBC

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# Typical management's objectives

- P&L (Return, ROE, ROAC, ...) – both level and volatility
  - e.g. to attain P&L at the level of 2,000 mio CZK, with tolerance of 5% down and 10% up, respectively, and with the probability of 80% (4 in 5 years)
- Capital adequacy
  - e.g. to have the Solvency 1(2) ratio in the range of 150% to 180% with the probability of 90% (i.e. possible breach once in 10 years)
- Value creation, economic profit

# Link to Risk Appetite Statement

- These 3 objectives are usually expressed in the Risk Appetite Statement (RAS) of a company (along with other statements)
- Other statements may be e.g. „Rating Statement“, „Operational Excellency Statement“, „Market Share Statement“, profiling (investment vs. technical part, innovators vs. clever followers, trend-setters...)

# Meeting the 3 objectives

- ❑ These 3 objectives (P&L, Capital, Value) are usually addressed in the Financial Plan of a company
  
- ❑ However, there are some drawbacks
  - Financial Plan is usually based on a (couple of) deterministic scenario(s)
  - So it does not capture the full volatility of the result caused by the uncertainty of economic scenarios (swap rates, spreads, FX rates, equity index, property index, inflation, ...)
  - It also does not capture volatility stemming from non-economic factors (CAT losses, big claims, operational losses, ...)
  
- ❑ Hence the Financial Plan cannot give a definite answer to
  - **Uncertainty of the result and capital position**
  - **What is the best business structure corresponding to the best assumptions about the future at disposal**

# Concept of IBSOT

- IBSOT = Insurance Business Structure Optimization Tool
- It projects a full histogram of P&L, Solvency 1 (ratio, capital), Solvency 2 (ratio, OF, SCR), technical P&L, investment P&L etc., etc. over a period of 1 calendar year
- It originally started (in 2011) as a concept/tool addressing the before mentioned main RAS (P&L, Capital, Value)
- It is not a planning tool !!!
  - but it can be used for checking the appropriateness of the plan from the risk perspective (whether it is compliant with a given RA i.e. ORSA in planning process)

# IBSOT – Core principles

- It works with the outer scenarios and business strategies
- It deploys a full stochastic (histograms are build using a real underlying stochastic, there are no simplifying assumptions on the type of distribution nor other simplifications – e.g. least square Monte Carlo)
- Works in real-time (in seconds, up to 1 minute)
- *Under given set of stochastic scenarios (i.e. outer scenarios)*
  - economic, CATs, big losses, operational losses, impairments, ...
  - *we propose the optimal business structure (i.e. business strategy)*
    - products/LoBs composition, reinsurance policy, strategic asset allocation
  - *to optimize the objective function*
    - P&L or a mix of P&L and Value
  - *while ensuring that the capital adequacy*
    - S1, S2, S&P ICAM, internal CAM...
  - *is met (according to a given RAS)*

# IBSOT – Core principles - cont.

- The underlying magic is a clever architecture and massive off-line processing
- It uses an existing actuarial infrastructure (Life, Non-Life and Assets moduls) - these external moduls are not part of IBSOT and can be easily replaced by different moduls (interface between IBSOT and these moduls is predefined)
- Stochastic is taking place in external moduls and is run off-line (heavy processing, in weeks of runtime, no simplifications used)
- Adding other stochastic factors (e.g. inflations) or implementing a dynamic ALM takes place in a particular off-line (external) modul and has no impact on IBSOT runtime (but it obviously can have an impact on the off-line processing runtime)

# IBSOT – Core principles - cont. 2

- IBSOT projections are as precise as precise is the underlying actuarial infrastructure
- The know-how is
  - the way the off-line and on-line parts are split to provide an instant on-line response times avoiding simplifications (e.g. linearity tradeoff) - for instance, Solvency 2 correlation structures are calculated on-line; the same goes for investment/reinvestments
  - The mathematical and SW algorithms (developed, used, enhanced) – for instance, the efficient portfolio of liabilities

# IBSOT – what it can be used for

## ■ Business steering

- Finding the optimal strategy under given constraints
- Testing of various business strategies (e.g. MTPL growth, Corpo decline)
- Portfolio optimization

## ■ Risk Appetite

- Checking whether the overall Risk Appetite (P&L and Capital statements) has been set adequately
- Cascading the overall Risk Appetite (P&L and Capital statements) across the company

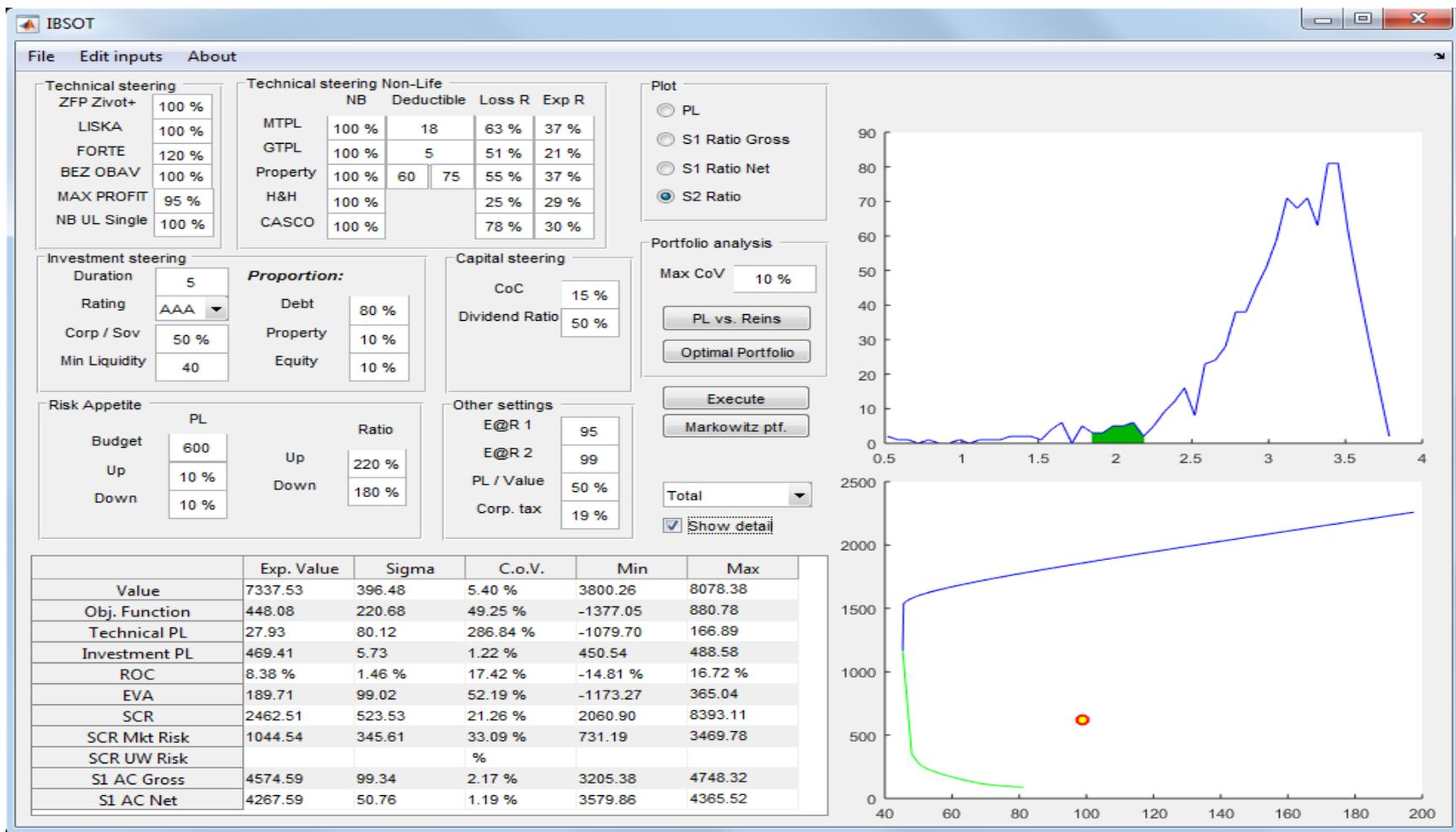
## ■ Financial plan

- Checking the attainability of the P/L and capital targets

## ■ Risk analytics

- If-then analysis
- Testing of various outer scenarios (economic environment, CAT frequency)
- Reinsurance program (efficiency) testing
- Investment strategy testing

# IBSOT – main screen in MATLAB



# Contact



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# Thank you!